



# PATENT SPECIFICATION

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## PROVISIONAL SPECIFICATION.

### Improvements in Vehicle Window Opening and Closing Apparatus.

I, STEPHEN SIMPSON, of Minehayes, Haytor, Newton Abbot, of British nationality, do hereby declare the nature of this invention to be as follows:—

5 This invention relates to mechanism for opening and closing vehicle windows, and for setting the same in the desired position.

In carrying the invention into effect I provide a metal plate to fix to a convenient part of the framework of the vehicle. This plate carries on a stud or axle, a wheel having on the outer portion of its periphery teeth to carry a chain and adjacent thereto gear teeth to engage with a pinion. This pinion is fixed upon a spindle having at one end a pivot working in a bearing attached to the aforementioned metal plate, and at the other end a suitable clutch mechanism is fixed for retaining the window in the desired position. An operating handle connected to a part of the clutch mechanism is supported by an outer bearing fixed to the metal plate or to a convenient part of the framework.

10 The combined chain and gear wheel is recessed on the side adjoining the metal plate to receive a coiled spring to balance or take part of the weight of the window. Two tubular guides or channels of square or rectangular section are attached to the metal plate one on each side of the above mentioned chain wheel and are arranged so as to guide the chain, vertically and parallel with the face of the glass and to keep the chain (which is not connected at the ends) in gear with the chain wheel.

One of the pins of the chain at some distance from one end is extended to project 40 through a longitudinal slot in one of the guides. This pin, which in some cases may carry a roller, engages with a horizontally slotted plate attached to the lower edge of the window frame (or to a metal channel fixed to the glass), so that upon the chain wheel being rotated by the operating handle the window is opened or closed.

The slotted plate is bent or shaped to enable the window to be easily fixed in position or removed when in the closed position.

The lower ends of the chain guides may be connected together and fixed to a convenient part of the framework of the vehicle or in some cases sockets or fixings may be arranged for the guides, so that the whole of the mechanism may be removed for repair or adjustment without removing the linings or trimmings of the vehicle. Suitable stops are provided for controlling the stroke or movement of the chain and window.

It will be understood that the invention may be carried into effect by means other than those specifically described so long as substantially the same operation is secured, but that the invention comprises the constructional features specified.

Dated this 22nd day of November, 1922.

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## COMPLETE SPECIFICATION.

### Improvements in Vehicle Window Opening and Closing Apparatus.

I, STEPHEN SIMPSON, of Minehayes, Haytor, Newton Abbot, of British nationality, do hereby declare the nature of this invention and in what manner

the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to mechanism for opening and closing vehicle windows, and for setting the same in the desired position, of the kind in which a sliding window sash is operated by means of a chain and sprocket wheel, fitted with means whereby the sprocket wheel may be maintained in any position of adjustment and thus retain the window accordingly, the weight of the window being advantageously balanced by such means as a spring.

The invention has for its object to provide an improved and simplified construction of such mechanism.

According to the invention the chain is constrained from lateral movement by guide surfaces or is received into a guide or channel. The chain may be thus constrained only upon that side of the sprocket wheel upon which the weight of the window sash is exerted or it may be guided at both sides.

According to the invention, moreover, a discontinuous chain may be provided for operation by a single sprocket wheel, the said chain being constrained against lateral movement in the manner before described.

According to the invention, moreover, the lower part of the frame or support of the mechanism is engaged detachably with a fixed part or frame member of the vehicle and for this purpose the guides or channels by which the chain is constrained may be employed as part of the frame or support. The guides or channels for the chain may be provided to afford guidance around the periphery of the sprocket wheel.

According to the invention, moreover, the window sash is engaged with the supporting chain in a detachable manner by means of a pin and slot connection in which the slot is formed to permit the pin to move out of engagement therewith.

According to the invention, moreover, the sprocket wheel, having on the outer portion of its periphery teeth to carry the chain by which the window is supported, is provided also with a peripheral series of teeth to engage with a driving pinion fitted upon a spindle disposed parallel with the axis of the sprocket wheel.

According to the invention, moreover, the spindle of the driving pinion is provided with clutch mechanism adapted to co-operate with a stationary clutch member for the purpose of maintaining the spindle in any position of adjustment

and thus retaining the window in the desired position and an operating handle is connected to a part of the clutch mechanism in such manner that its rotation serves to effect rotation of the said spindle.

According to the invention, moreover, a clutch mechanism is provided comprising a spring pressed plunger carried by the spindle of the sprocket driving pinion, a fixed braking or clutch surface with which the said spring pressed plunger is normally adapted to contact, and an operating member disposed intermediate the spindle and the fixed braking or clutch surface, the said operating member being formed with cam surfaces adapted for engagement with corresponding cam surfaces upon the spring pressed plunger, in such manner that rotation of the operating member in either direction first effects the retraction of the spring pressed plunger from the fixed braking or clutch surface and then the rotation of the spindle of the driving pinion in the corresponding direction through the spring pressed plunger.

The construction of a vehicle window opening and closing mechanism according to the invention is illustrated, by way of example, in the accompanying drawings.

Figure 1 is a rear elevation.

Figure 2 is a cross-sectional elevation.

Figure 3 is a plan view.

Figure 4 is a detailed cross-sectional view of the clutch mechanism.

Figure 5 is a cross-section through one of the chain guides or channels to an enlarged scale.

Figure 6 is a plan view of the plate forming the slot for the reception of the pin by which the window sash is supported upon the chain.

In carrying the invention into effect according to the construction illustrated in the accompanying drawings, the metal supporting plate *a* for the mechanism is fixed to a convenient part of the frame work of the vehicle or to a bar or batten suitably provided for the purpose. This plate carries upon a stud or axle *b* the sprocket wheel *c* having on its periphery a series of teeth *c*<sup>1</sup>, to carry the chain *d* by which the window sash *e* is supported. The sprocket wheel *c* is also provided integrally with a peripheral series of teeth *c*<sup>2</sup> for engagement with a driving pinion *f*, which is fixedly secured upon a driving spindle *g*, the rear extremity of which is carried in a bearing formed in a bracket *h*, secured to the rear of the plate *a*. The forward end of the spindle *g* is carried within a sleeve

5 *i* mounted within a cylindrical or cup-like casing *j* and protruding outwardly therefrom to receive an operating handle *k*. A connection between the operating handle *k* and the driving spindle *g* is effected by means of the braking or clutch mechanism hereinafter described. The driving spindle *g* is formed with or carries a cylindrical collar *g*<sup>1</sup>, while the sleeve *i* is formed integrally with a disc or annular surface *i*<sup>4</sup>, the periphery of which is flanged to form a cylindrical sleeve *i*<sup>2</sup> adapted to enclose the collar *g*<sup>1</sup>. The said sleeve *i*<sup>2</sup> is interrupted or recessed at *i*<sup>3</sup> and the collar *g*<sup>1</sup> is provided with a radial recess in which is received a hollow plunger *l*, which under the action of a spring *m* disposed within it and resting upon the bottom of the recess protrudes from the collar *g*<sup>1</sup> into the recess *i*<sup>3</sup>, so that its extremity contacts with the inner peripheral surface *j*<sup>1</sup> of the casing *j*. The outer extremity of the plunger *l* is formed with bevels or cam surfaces *l*<sup>1</sup>, while the edges of the sleeve *i*<sup>2</sup> forming the recess *i*<sup>3</sup> are also formed as bevels or cam surfaces *i*<sup>4</sup> adapted to co-operate with the cam surfaces *l*<sup>1</sup>. The inner surface *j*<sup>1</sup> of the casing *j* is advantageously provided at one or more points with grooves *j*<sup>3</sup> into which the outer extremity of the plunger *l* may enter.

35 The sprocket wheel *c* is recessed on the side adjacent the supporting plate *a* to receive the coiled spring *n* adapted to compensate the weight of the window sash *e* wholly or partially. The one extremity of the spring is secured to a pin *a*<sup>1</sup> mounted upon the plate *a* while the other extremity of the spring is secured to the sleeve or boss *c*<sup>3</sup> of the sprocket wheel *c* by which it is carried upon the stud or axle *b*.

45 The bracket *h* is formed to receive two tubular guides or channels *o* of square or rectangular section, disposed in such positions that they may receive those portions of the chain *d* not engaged with the sprocket wheel *c* and may serve also to assist to maintain the sprocket wheel in position. The lower ends of the guides or channels *o* are advantageously connected by a plate *o*<sup>1</sup> formed with a slot *o*<sup>3</sup> adapted to engage in a readily detachable manner with a stud *r* carried by the frame work of the vehicle or by a bar or other support provided for the purpose. The plate *o*<sup>1</sup> may alternatively be provided with a projection or foot adapted to be received into a socket carried by the said frame, so that when the casing *j*, the spindle *g* and pinion *f* have been removed, upon withdrawal of the screws retaining the plate *a*, the whole of

the mechanism may be removed for repair or adjustment without removing the linings or trimmings of the vehicle. The guides or channels *o* serve to guide the chain vertically and parallel to the face of the glass of the sash and to maintain the chain in gear with the sprocket wheel. In certain instances it may be advantageous to provide a guide for the chain around the upper half of the periphery of the sprocket wheel *c* and such guide may be formed integrally with the guides or channels *o*.

One of the pins *d*<sup>1</sup> of the chain *d* at a suitable distance from one end of the chain is extended rearwardly to project from the corresponding guide or channel *o*. The said pin, which may be fitted with a roller, engages with a plate *e*<sup>1</sup> secured to the lower edge of a metal channel *e*<sup>2</sup> supporting the glass or lower edge of the window frame, the plate *e*<sup>1</sup> forming with the channel *e*<sup>2</sup> a horizontal slot in which the pin is received so that upon the sprocket wheel *c* being rotated by the operating handle *k*, the sash is raised or lowered. Suitable stops, such as the stop *p*, may be provided for determining the movement of the chain and thus of the window, such stops being adapted to engage with the pin *d*<sup>1</sup> of the chain *d* or other pins provided on the chain for the purpose. The plate *e*<sup>1</sup> is bent or formed of a shape such as that illustrated in Figure 6 so that the window sash may be readily engaged or disengaged from the pin *d*<sup>1</sup> when in the closed position, and the pin *d*<sup>1</sup> is moved forward to pass to that part of the plate *e*<sup>1</sup> which does not contact with it and upon which it cannot bear, and is prevented from passing out of position relatively to the plate *e*<sup>1</sup> by the stop *p*. It will be understood that while the window sash together with the plate *e*<sup>1</sup> is raised out of engagement with the pin *d*<sup>1</sup>, the pin is held against the stop *p* by the action of the balancing spring *n* and is thus in position ready for re-engagement with the plate *e*<sup>1</sup> when the sash is lowered into position again and the chain moved in the opposite direction.

In the operation of the mechanism it will be understood that when the handle *k* is rotated in one direction or the other, the cam surface *i*<sup>4</sup> which advances towards the plunger *l* contacts with the corresponding cam surface *l*<sup>1</sup> and depresses the plunger *l* into the collar *g*<sup>1</sup> to the degree necessary to release the extremity of the plunger from the groove *j*<sup>3</sup> in the inner surface *j*<sup>1</sup> of the casing *j*, with which it is engaged. The cam surface *i*<sup>4</sup> then contacts completely with the cam surface *l*<sup>1</sup> of the plunger *l* and the

sleeve *i* is thus locked to the driving spindle *g*.

The plunger *l* is advantageously hollow so that the spring *m* is received within it and the length of the plunger is such that it cannot be depressed wholly into the collar *g*<sup>1</sup>. In the continued rotation of the handle *k* therefore, the sleeve *i* engaging with the extremity of the plunger *l*, rotates the spindle *g*, and thus the pinion *f* and the sprocket wheel *c*.

It will be understood that the invention is not limited to the details of construction of the mechanism hereinbefore described. Thus, the extremity of the plunger which contacts with the fixed braking or clutch surface may be of such area that the provision of grooves in the said surface is unnecessary.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Vehicle window opening and closing apparatus of the kind described, in which the chain is constrained from lateral movement by guide surfaces or is received into a guide or channel, substantially as described.

2. Vehicle window opening and closing apparatus of the kind described, in which the chain is constrained at both sides of the operating sprocket wheel by guide surfaces or is received into guides or channels substantially as described.

3. Vehicle window opening and closing apparatus of the kind described, wherein a single sprocket wheel is provided and the chain depending therefrom is constrained against lateral movement, substantially as described.

4. Vehicle window opening and closing apparatus of the kind described, wherein a single sprocket wheel and a discontinuous chain are provided, the said chain being constrained against lateral movement by guide surfaces or a guide or guides, substantially as described.

5. Vehicle window opening and closing apparatus operated by a sprocket wheel and chain, according to Claim 1, 2, 3 or 4, wherein the lower part of the frame or support of the mechanism is engaged detachably with a fixed part or frame member of the vehicle, substantially as described.

6. Vehicle window opening and closing apparatus as set forth in Claim 1, 2, 3 or 4, in which the guides or channels for the chain are provided to afford

guidance around the periphery of the sprocket wheel substantially as described.

7. Vehicle window opening and closing apparatus, as set forth in Claim 1, 2, 3 or 4, in which the window sash is engaged with the supporting chain in a detachable manner, by means of a pin and slot connection in which the slot is formed to permit the pin to move out of engagement therewith, substantially as described.

8. Vehicle window opening and closing apparatus as set forth in Claim 1, 2, 3 or 4, in which the sprocket wheel is provided on the outer periphery with two series of teeth, one of which engages the window sash supporting chain and the other a driving pinion fitted upon a spindle disposed parallel with the axis of the sprocket wheel, substantially as described.

9. Vehicle window opening and closing apparatus, as set forth in Claim 1, 2, 3, or 4, in which the spindle of the driving pinion is provided with a clutch mechanism adapted to co-operate with a fixed clutch member for the purpose of maintaining the spindle in any position of adjustment, one member of the clutch mechanism being connected to an operating handle, substantially as described.

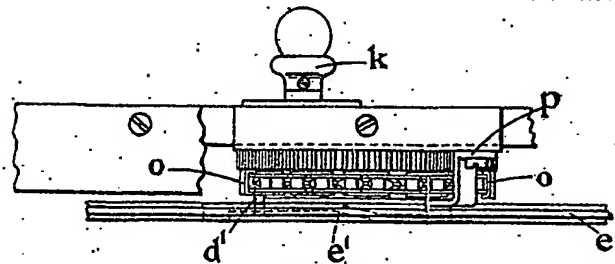
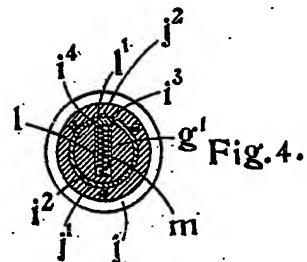
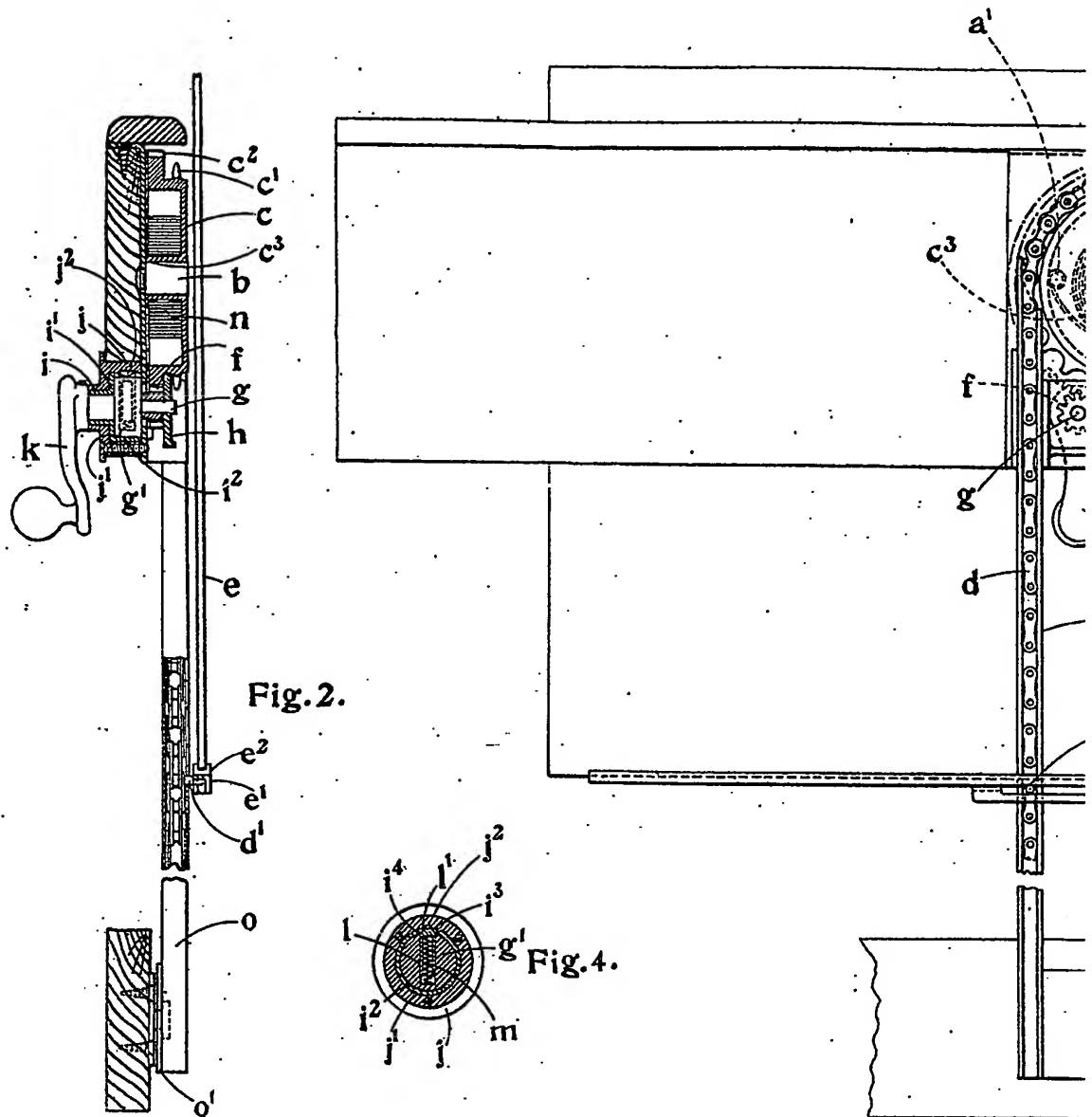
10. Vehicle window opening and closing apparatus, as set forth in Claim 1, 2, 3 or 4, in which a braking or clutch mechanism is provided comprising a spring pressed plunger carried by the spindle of the sprocket driving pinion, a fixed braking or clutch surface with which the said spring pressed plunger is normally adapted to contact, and an operating member disposed intermediate the spindle and the fixed braking or clutch surface, the said operating member being formed with cam surfaces adapted for engagement with corresponding cam surfaces upon the spring pressed plunger, in such manner that rotation of the operating member in either direction first effects the retraction of the spring pressed plunger from the fixed braking or clutch surface and then the rotation of the spindle of the driving pinion in the corresponding direction through the spring pressed plunger, substantially as described.

11. Vehicle window opening and closing apparatus, substantially as described with reference to and as shown in the accompanying drawings.

Dated this 22nd day of August, 1923.

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[This Drawing is a reproduction of the Original on a reduced scale]



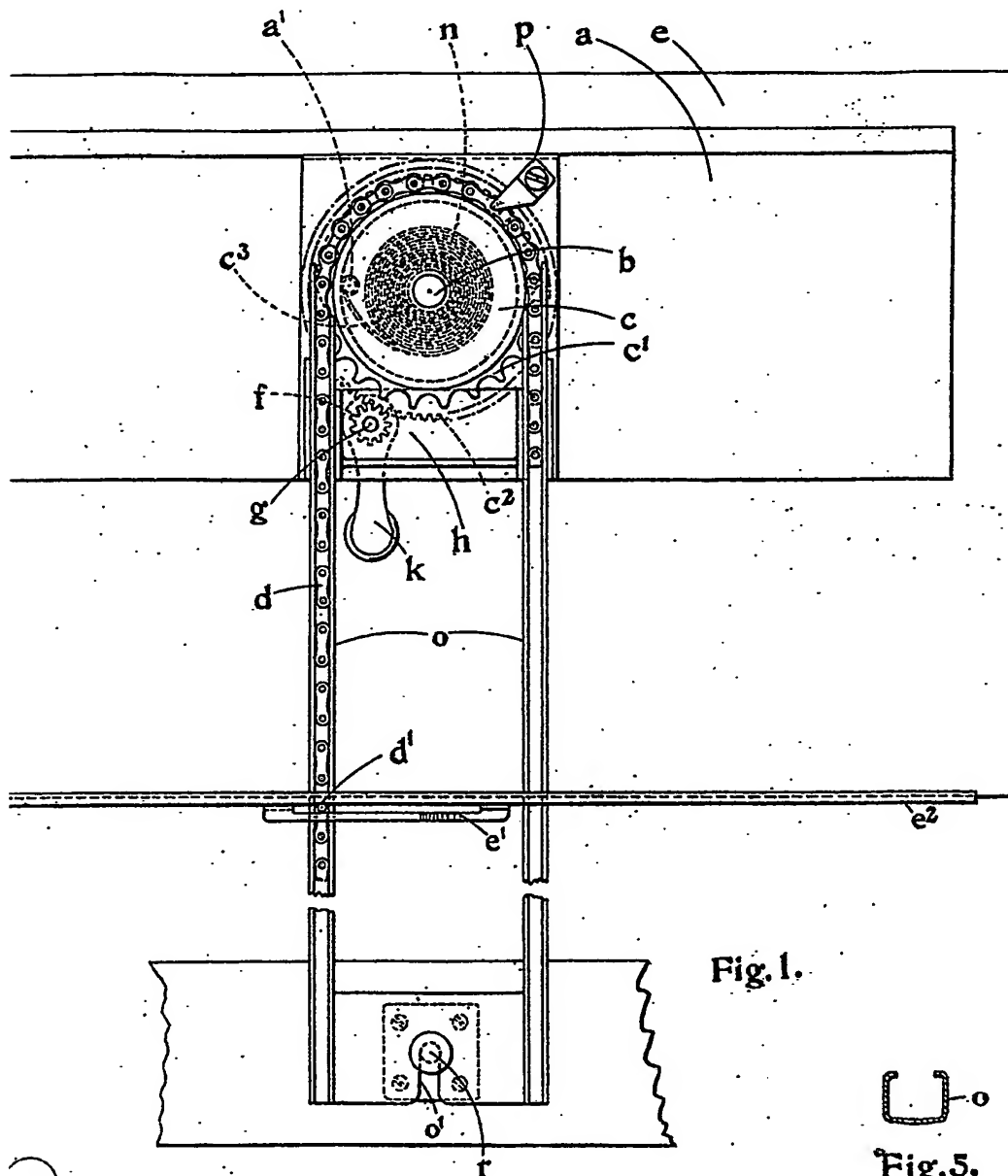


Fig. 1.



Fig. 5.

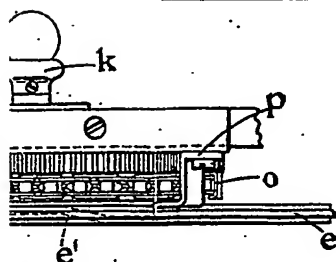


Fig. 3.



Fig. 6.

[This Drawing is a reproduction of the Original on a reduced scale]

